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ABSTRACT

A study identified the behavior and attitude of three science education graduate students assigned to two different science education professors. These professors taught separate sections of the same science methods course at a university. The symbolic interactionist and functionalist positions were taken as a theoretical perspective. Data collection methods used were individual interviews and participation observation. Analytic induction was performed in the constant comparative procedure to examine the data collected. Patterns of similarity and differences in the behaviors and attitudes of the graduate assistants recognized in the data became analytic concepts, the constructs. The constructs for graduate assistant behavior were professor-prompted behaviors and career-prompted behaviors. The constructs for attitude were loyal follower, drafted worker, and critical constructor. Generating theory was the aim of this research, although the resulting insights are meaningful in similar contexts. The study suggests a complex interaction among the career goals of graduate assistants, the science education philosophies of professors, and the organization of early childhood science methods classes. The result is differences in attitude and behavior expressed by the graduate assistants. (KR)

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Behavior And Attitude Of Science Education Graduate Assistants: A Case Study

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Abstract

This study identifies the behavior and attitude of three science education graduate students assigned to two different science education professors. These professors taught separate sections of the same science methods course at a university. The symbolic interactionist and functionalist positions are taken as a theoretical perspective.

Data collection methods used were qualitative. Analytic induction was performed in the constant comparative procedure to examine the data collected.

Patterns of similarity and differences in the behaviors and attitudes of the graduate assistants recognized in the data became analytic concepts, the constructs. The constructs for graduate assistant behavior were professor-prompted behaviors and career-prompted behaviors. The constructs for attitude were loyal follower, drafted worker, and critical constructor.

Insights emerging from this study suggest that there is an interaction between the organization of the courses, the education philosophies of the professors teaching the different sections and the career goals of the graduate assistants. The result is differences in behavior and attitude exhibited by the assigned graduate students, some of which is arguably not beneficial to their professional development or to future improvement in science education methods courses.

Generating theory is the aim of this research, although the resulting insights are meaningful in similar contexts.

This case study identifies the patterns of behavior and attitude of three science education graduate assistants who are assigned to two different professors at a university. The professors teach separate sections of the same methods course, and the graduate assistants help with the classes. Theory building is the aim of this research, although the resulting insights are meaningful in similar contexts.

Background

Graduate students working on professional degrees in science education frequently have departmental scholarships available to them. These graduate assistantships provide a tuition waiver and a moderate monthly stipend for the academic year. In exchange for these assistantships, graduate students are obligated to work a required number of hours for their academic department. This work varies across schools, but most commonly it involves the graduate student being assigned as an assistant to one professor in the department. Some professors have more than one graduate assistant assigned to them while other professors have none.

In addition to basic research in science pedagogy, science education departments are responsible for teaching science method courses that fulfill state certification requirements for prospective teachers K-12. Because class size is limited to a small number in these courses and the demand for the course by early childhood education majors is large, several sections of the course are offered in any one academic term (except for

summer when usually there is none). These sections of the same course are most frequently taught by different professors, who are aided by their graduate assistants.

The Setting: The Department and The Professors

The Science Education Department described in this paper is a large department within a state university. Traditionally, the department offered three sections of the science methods course for early childhood majors taught by three different professors.

During the academic term observed, only two professors have been available to teach the sections of the course because one professor abruptly left the campus before fall quarter. These two remaining professors have different educational philosophies, reflected in how the sections are taught. One professor, Dr. "Process," emphasizes the need for preservice teachers to master science process skills like observation and prediction to achieve competency in teaching elementary students science. He requires the students to team teach each process skill after he models how it can effectively be done. Students not teaching at any one time participate in the class by acting like elementary students being taught. The other professor, Dr. "Mixture," addresses what he sees as several necessary areas of pedagogy. This includes a lecture review of national curriculum programs, lessons on effective teaching techniques derived from research, student readings in science content, peer teaching in group experiences, and individual student micro-teaching experiences that are

videotaped and critiqued. Both instructors are full professors highly respected in their field of expertise, science education.

Three graduate assistants described in this paper were assigned to these two professors during the academic term of this research.

Theoretical Perspective

This study takes both symbolic interactionist and functionalist positions (Goetz & Hansen, 1974). From the symbolic interactionist paradigm, meanings are attributed to the behavior and attitude of the participants. Individual behaviors and attitudes are postulated to result from the interaction of the participant interpretations, personal interests, and constraining influences. From the functionalist paradigm, a structure identified by an outside observer can be used to explain these social processes. Categorization of the behavior and attitude of the graduate assistants according to the participants perception and to the relationship with their sponsoring agent reveals the function of the behavior and attitude in relation to other parts of the social system. (Goetz, 1976)

Methodology

As the single researcher, I took the role of observer within a science education department. Date collection methods used were individual interviews and participant observation. Analytic

induction was performed in the constant comparative procedure to examine the data collected (Glaser & Strauss, 1967); (Goetz, 1984). Data were first chunked into categories for each graduate assistant according to personal background, organization of the science methods course, and the behavior and attitude related to the individual association with the science methods course. The behaviors and attitudes of the graduate assistants were arranged in two matrices, one showing behavior and the other showing attitude, to contrast the different sections of the science methods course taught by different professors.

Patterns of similarity and differences in graduate assistant behaviors and attitudes recognized in the data then became constructs. These are analytic concepts that offer insight from the observer's outside perspective into the effect of the organization of the science methods course for early childhood majors on the behavior and attitude of the graduate assistants assigned to those sections.

Limitations

This is a limited case study of one course in a science education department. It can provide only some insight across the range of similar classes. This study can be regarded as empirically and methodologically grounded for further investigation.

Description of the Graduate Assistants

"Alex" is a single white male in his 30s. He is studying for an Ed.D. This is his sixth academic term as a graduate assistant assigned to Dr. Process. He has a B.S. in zoology. During his graduate program, he has taken nearly fifty credit hours in pure science, "as long as that precludes physics and chemistry." He taught for five years in the state where the university is located in a private school. He taught 10th grade biology and 8th grade Earth science. During the previous two academic terms, he also taught two sections of the early childhood science methods course and took over a third section when the professor left to act as an consultant to a foreign government for many weeks. He chose to study in this department because of its geographical proximity, its "financial feasibility" resulting from an assistantship, and its national reputation. He describes himself as a "teaching assistant" when referring to his role connected with the science methods course.

"Mary" is a married, white female in her 20s. She is studying for a M.Ed. She has a B.S. in biology, with a minor in chemistry. While an undergraduate, she was a premed student. This is her second academic term as a graduate assistant assigned to Dr. Process. This academic term, she has spent three weeks in a public school as part of a practicum for her secondary methods course. Her teaching background is on the undergraduate laboratory level in an out-of-state college. She taught a biochemistry laboratory and worked as a work-study assistant in

anatomy and physiology and in comparative invertebrate biology. She chose to study in this department because she was living out of the state and wanted to return, because the department has "one of the best programs," and because she had hope for an assistantship. She describes herself as a "gopher" when referring to her role involved with the science methods course.

"Phil" is a married, white male in his 40s. He is studying for a Ph.D. He has a B.A. in psychology with a minor in sociology. He had "intended to be a science major." His background in science is "minimal." During the previous two academic terms, he took the science content component of the middle school program as a start to fulfill the science content requirement of 35 credit hours. This is his second academic term as a graduate assistant assigned to Dr. Mixture. Phil had requested to be assigned to his professor so that he could work with the early childhood majors. His teaching experience is in public, "rural middle-America schools" in the mid-west for five years. He taught one year of 4th grade and four years of 5th grade, where he had two or three sections of science. He chose to study in this department because of the department's "international reputation" and "the assistantship that would make it feasible for me to be here with a family." He describes himself as a "graduate assistant" when referring to his role involved with the science methods course.

Graduate Assistant Behavior

An analysis of the rich, descriptive data resulted in the identification of discrete behaviors the three graduate assistants displayed during the time of research. This behavior is connected with carrying out their duties for the section of the early childhood science methods course to which they were assigned. These behaviors best suggest two separate patterns that make up the following categories: professor-prompted behaviors and career-prompted behaviors. These two categories, although not mutually exclusive, do serve to illustrate the primary motivation for each behavior.

Professor-prompted behaviors refer to those behaviors dictated by the individual professor's science education philosophy and research interest. These are behaviors the graduate assistants display while performing the duties required to help the professor achieve his pedagogical goals. Career-prompted behaviors, in contrast, are those voluntary behaviors performed by the graduate assistants to add experience or information that contribute to their career interests. These behaviors are optional, and although not formally discouraged by the professors, are considered subsidiary to carrying out the other behaviors dictated by the professors.

Insert Table 1 about here

Graduate Assistant Attitudes

An analysis of the data also leads to the identification of graduate assistant attitudes on the different facets of interaction with the science methods course. These attitudes are best bunched in categories representing three separate patterns: loyal follower, drafted worker, and critical constructor. Attitudes of the loyal follower stem from a respect for the individual professor. These attitudes include admiration and a willing desire to model the behavior after the assigned professor. Attitudes of the drafted worker stem from being assigned to a professor whose expertise is not the career goal of the graduate assistants. These attitudes include anxiety and being apprehensive about working with the science methods course. Attitudes of the critical constructor stem from the need to learn as much possible to help produce the "best" science methods course later when the graduate assistant is responsible for teaching a similar course as a professor. These attitudes include interest in the similarities and differences between the course currently taught and other science methods courses experienced and dissatisfaction with learning how to teach the course in only one way.

Insert Table 2 about here

Discussion

An analysis of the data focuses on the patterns of behavior and attitude of the graduate students assigned to the early childhood science methods course. Comparisons and contrasts of the graduate assistants assigned to the different science education professors are presented.

Behaviors

The categories that emerged from the data analysis, professor-prompted behavior and career-prompted behavior illuminate the similarities and differences of the graduate assistants' behaviors exhibited in the different sections of the course.

Under professor-prompted behavior, in both sections of the course the graduate assistants help their professors with the early childhood science methods course and the professor's individual research. Most of the time worked by the graduate assistants directly relates to the course. The graduate assistants in both sections perform managerial tasks, including gophering for their professors. This involves searching the department for material and equipment needed by the professor and students. When the professor is unable to attend class because of other responsibilities, a graduate assistant from each section substitutes for that professor until he returns.

Differences in behavior displayed by the graduate students between the two sections under professor-prompted behavior

relates to the different instructional strategies chosen by the professors. Dr. Process assigns students to teaching teams who teach their fellow students short process-oriented lessons. The students being taught act as what they imagine elementary students would do act in the lesson. The graduate assistants in his class therefore attend every class and mingle with the students play acting. Those graduate students later provide the professor with feedback on the team teachers' performance. Dr. Mixture requires his students to be videotaped while teaching individual micro-lessons. This requires his graduate assistant to setup the video recorder and film the students. Later, he also helps with the student evaluation. When the students are not being videotaped, the graduate assistant is expected to sit and quietly observe the class.

Under career-prompted behavior, there are no similarities between the behaviors of the graduate assistants in the two sections. One of Dr. Process's graduate assistants, Alex, has voluntarily adopted the professor's dynamic teaching style that "sells the product very well." He sees this as improving his teaching style across the board. Dr. Mixture's graduate assistant, Phil, in contrast, volunteers to teach certain topics in his own style three or four times a quarter. He continues to observe his professor's class every day even though his professor has told him it is not required for his assistantship. He has arranged visits to the other professor's class to broaden his experiences with the course. He initiates discussions with the

other graduate assistants comparing and contrasting the two sections. He discusses teaching strategies with both professors. He perceives "down the road I'll be teaching this kind of course" and actively engages himself in comparing and contrasting not only these two courses but also the science methods course he took as an early childhood major.

Attitudes

The categories that emerged from the data analysis, loyal follower, drafted worker, and critical constructor also illuminate the similarities and differences of the graduate assistant's attitudes demonstrated in the different sections of the course.

Under loyal follower, all three of the graduate assistants express respect for the professors they have been assigned. They enjoy referring positively to both the course and the professor. They like being considered a "friend" or a "colleague" by the professors. They are willing to perform whatever tasks their professors ask them to do to help with the courses or research.

Differences between the graduate assistants under loyal follower lie in the extent of identification with the professor's philosophy of science education and his teaching style. Alex expresses his own teaching style in the early childhood science methods course this way:

> I model my behavior after him, I suppose. I pretty much follow his syllabus ideas and I use the materials that he uses. So it is like I have tried to clone myself after him.... I am not an elementary expert by any means. And I feel, I felt inadequate to begin with. So, that feeling of inadequacy was probably one of the things that made me cling to what I was, you know, involved with as far as elementary education. (Interview 2/28/90)

Mary also refers to Dr. Process in this way:

> I appreciate the respect that he gives me because I feel like I'm down here and he's up there. Undeserving of his respect because I certainly respect him quite a bit. I think he does an excellent job. Since I do not have an elementary background, I'm really glad I've been able to watch him teach . . . . (Interview 3/8/90)

In contrast, Phil refers to his working relationship with Dr. Mixture and his philosophy of teacher education in this fashion:

> Father and son. Absent-minded father sometimes....It is close . . . . We do have different organizational habits....Because an instructor can be very good, very dynamic, but if it is only their course, I think it would be a lot less. You learn how they teach. But as a

> participant, you may never feel comfortable because you're wondering how do you measure up to their standards. Even if they don't intentionally impose that on you. Dr. [Mixture] addresses the key points and he allows me the chance to express what I value. (Interview 3/7/90)

Under drafted worker, both Mary and Alex expressed initial anxiety," "inadequacy," and being "apprehensive" about being assigned to early childhood education. Although they came to appreciate the opportunity to work with Dr. Process and the early childhood student population, which broadened their perspectives, initially there was confusion. The assignment did not directly relate to their career interests.

> At the beginning, I thought I need to be working with secondary methods because that is what I'm interested in. So at the beginning I really did not understand why I was working with an early elementary education professor! (Mary, interview 3/8/90)

In contrast, Phil actively sought to be assigned to his professor and the early childhood science methods course. In referring to the students, he says

> I have felt confident from the beginning to be with those

people. Because they are, in a sense, really the colleagues with which I have worked with. (Interview 3/2/90)

Under critical constructor, there is little similarity between the attitudes of the graduate assistants in the two different sections. Dr. Process's students do like to discuss the similarities and differences between the two sections if Phil initiates the discussion. But they do not exhibit any feeling of dissatisfaction with the course in which they have participated. Phil, however, has many feelings about the sections. He believes the course is instructor dependent and feels disappointed it is just a "class" and not a course with agreed upon objectives by the different professors. He does not like the absence of a field-based component. He feels dissatisfied that the course is the first methods course in the sequence of early childhood methods courses. He would prefer it being the last in the sequence so that the prospective elementary teachers would be more likely to use the science methods when student teaching. He enjoys making the effort to personally see how the sections are similar and different. Finally, he feels sure that the other graduate assistants' goals lie elsewhere, and not directly in line with his--elementary science education. That makes him feel more alone in his quest to immerse himself in elementary science issues.

Conclusion

This study suggests that there is a complex interaction between the career goals of the graduate assistants, the science education philosophies of the professors teaching the different sections, and the organization of the early childhood science methods classes. The result is differences in attitude and behavior expressed by the graduate assistants.

Initially, the attitudes of the three graduate assistants in the study appeared to hinge on the correspondence between the level of the methods assignment and the career interest of the graduate assistants. The graduate assistant observed who had a direct career interest in teaching the early childhood methods class had taught elementary school for five years. He expressed respect for his professor but maintained a questioning attitude toward the professor's teaching philosophy and organization of the methods class. The other two graduate assistants without prior elementary school teaching experience did not hold a direct career interest in the science methods class. They expressed anxiety about their assignment and a veneration of their professor which did not promote a questioning attitude of his philosophy of science education or the organization of the class. This suggests that science education professors can expect different attitudes of their graduate assistants depending on their prior teaching backgrounds and career interests.

The science education philosophies of the professors directly impacted the organization of the early childhood science

methods classes and the behaviors of their graduate assistants in this study. As a result, the three graduate assistants exhibited behaviors in roles that ranged from fellow instructor to equipment securer. Those behaviors which discouraged two of the graduate assistants from perceiving themselves as able professionals, such as primarily securing equipment, arguably were not beneficial to their professional development or to the continued improvement of science teacher education. Other behaviors, such as planning and teaching several classes each term and debating the strengths and weaknesses of the different early childhood science methods classes observed, encouraged the other graduate assistant to perceive himself as an able professional. The confidence that he held allowed him to maintain a questioning, critical view toward any one observed way of teaching the class. His goal of striving to conceptualize an improved early childhood science methods class that he would implement when he became a professor of science education was an important part of his graduate assistant experience. If the limited sample of graduate assistants described in this study is representative of graduate students assigned to early childhood science methods courses, this suggests that science education professors can expect different behaviors of their graduate assistants as a result of the roles they are given to serve.

Further research exploring this area of research using the methodology demonstrated in this study can broaden the theoretical base and lead to clearer insights.

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Table 1: Behavior Matrix

Professor Process's Section	Professor Mixture's Section
Professor-prompted Behaviors	
* Sit in on class every day	* Keep attendance & grades
* Gather material for class, "gopher role"	* Set up video equipment, vide-tape students
* Provide feedback on team teaching	* Library research for professor's projects
* Participate in class as fellow student	* Help students and instructor with equip.
* Make sure door is unlocked	* Put materials away
* Lead class when professor is away	* Teach when professor is away
* Put materials away	* Help evaluate students micro-teaching
* Trouble shoot	
Career-prompted Behaviors	
* Act more enthusiastic when teaching	* Volunteer to teach 3 or 4 lessons per quarter
	* Come to class every day
	* Visit other sections of course
	* Discuss philosophy of teaching elementary science with professors and graduate assistants
	* Identify strengths and weaknesses of both classes

Table 2: Attitude Matrix

Professor Process's Section	Professor Mixture's Section
Loyal Follower	
* Likes modeling after the professor--"cloning" teaching style	
* Likes being told graduate assistant duties by the professor	* Enjoys being thought of by professor as "colleague"
* Likes professor's organization	* Relationship is like "Father and son."
* Feels sure professor is high up, graduate student is very low	
Drafted Worker	
* confused by being assigned to early childhood professor--felt that sheshould be assigned to secondary professor	

(more)

Critical Constructor

* Likes talking about differences sections if the other graduate assistant initiates discussion
* Feels critical of unorganized professor
* Does not like the course being instructor dependent: "It's just a class."
* Does not like absence of a field-based component in course
* Feels unsatisfied that course is at the beginning of the methods sequence
* Enjoys making effort to visit other section
* Feels isolated since he believes other graduate assistants' interests do not lie in elementary education